

### **Amendments to the Claims**

This listing of claims will replace all prior versions and listings of claims in the application:

#### Listing of claims:

1. (Currently Amended) A method for co-modelling a simulated packet network and a simulated optical network over which the simulated packet network operates on a computer comprising a processor and a computer-readable medium storing computer executable instructions for co-modelling the simulated packet network and the simulated optical network, the simulated packet network representing a plurality of packet links between packet network nodes and the simulated optical network representing a plurality of optical links between optical network nodes, the method comprising the steps of:

~~(1)~~the processor generating a basic packet capacity comprising a capacity value for each packet link based on packet network topology information and packet traffic information; and

~~(2)~~the processor generating a basic optical capacity comprising a capacity value for each optical link based on optical network topology information and the basic packet capacity, wherein the combination of the basic packet capacity and the basic optical capacity applied to the simulated packet network and a simulated optical network produce a co-modelled simulated packet transport network-;

wherein the step of the processor generating a basic packet capacity further comprises the steps of:

the processor combining the packet network topology information in the form of a packet network topology input to the processor and the packet traffic information in the form of a packet traffic matrix input to the processor to create the simulated packet network; and

the processor assigning each packet link of the simulated packet network a flow to create the basic packet capacity for the simulated packet network; and

wherein the step of the processor generating a basic optical capacity comprises the steps of:

the processor combining the optical network topology information in the form of an optical network topology input to the processor and the basic packet capacity to form the simulated optical network; and

the processor assigning each optical link of the simulated optical network a flow to create the basic optical capacity for the simulated optical network.

2. (Cancelled)
3. (Currently Amended) A method for co-modelling according to claim-2\_1, the method further comprising the steps of:
  - (1)-supplying the packet network topology input to the processor;
  - (2)-supplying the packet traffic matrix input to the processor; and
  - (3)-supplying the optical network topology input to the processor.
4. (Currently Amended) A method for co-modelling according to claim-2\_1, further comprising the processor generating the packet network topology input, the packet traffic matrix input and the optical network topology input for use in co-modelling the simulated packet network and the simulated optical network over which the simulated packet network operates.
5. (Currently Amended) A method for co-modelling according to claim-2\_1, wherein the packet network topology input comprises information regarding a plurality of routers in the simulated packet network, information regarding source-destination router ordered pairs in the simulated packet network, and information regarding a plurality of packet links in the simulated packet network, wherein the processor assigning each packet link of the simulated packet network a flow comprises the steps of:
  - (1)-the processor setting capacity to zero for all packet links;
  - (2)-the processor performing a series of steps, as follows, for each source-destination router ordered pair;

- ~~A~~—the processor determining a shortest packet path between routers;
    - ~~B~~—the processor establishing a source-destination packet traffic flow based on the shortest packet path; and
    - ~~C~~—the processor incrementing capacity of each packet link traversed by the packet traffic flow; and
  - ~~(3)~~—the processor increasing capacity of packet links per packet network engineering guidelines, wherein the packet network engineering guidelines pertain to average occupancy of the respective packet links.
6. (Currently Amended) A method for co-modelling according to claim ~~2~~<sub>1</sub>, wherein the optical network topology input comprises information regarding a plurality of cross-connect switches in the simulated optical network and information regarding a plurality of optical links in the simulated optical network, wherein the processor assigning each optical link of the simulated optical network a flow comprises the steps of:
- ~~(1)~~—the processor setting capacity to zero for all optical links;
  - ~~(2)~~—the processor performing a series of steps, as follows, for each packet link between two routers;
    - ~~A~~—the processor determining a shortest optical path between cross-connect switches supporting the two routers;
    - ~~B~~—the processor establishing an optical connection to support the packet link; and
    - ~~C~~—the processor incrementing capacity of each optical link traversed by the optical connection; and
  - ~~(3)~~—the processor increasing capacity of optical links per optical network engineering guidelines, wherein the optical network engineering guidelines pertain to occupancy of the respective optical links.
7. (Currently Amended) A method for co-modelling according to claim 5, wherein the optical network topology input comprises information regarding a plurality of cross-connect switches in the simulated optical network and information regarding a plurality

of optical links in the simulated optical network, wherein the processor assigning each optical link of the simulated optical network a flow comprises the steps of:

~~(1)~~the processor setting capacity to zero for all optical links;

~~(2)~~the processor performing a series of steps, as follows, for each packet link between two routers;

A. the processor determining a shortest optical path between cross-connect switches supporting the two routers;

B. the processor establishing an optical connection to support the packet link;  
and

C. the processor incrementing capacity of each optical link traversed by the optical connection; and

~~(3)~~the processor increasing capacity of optical links per optical network engineering guidelines, wherein the optical network engineering guidelines pertain to occupancy of the respective optical links.

8. (Currently Amended) A method for co-modelling and analyzing a simulated packet network and a simulated optical network over which the simulated packet network operates on a computer comprising a processor and a computer-readable medium storing computer executable instructions for co-modelling the simulated packet network and the simulated optical network, the simulated packet network representing a plurality of packet links between packet network nodes and the simulated optical network representing a plurality of optical links between optical network nodes, the method comprising the steps of:

~~(1)~~the processor generating a basic packet capacity comprising a capacity value for each packet link based on packet network topology information and packet traffic information; and

~~(2)~~the processor generating a basic optical capacity comprising a capacity value for each optical link based on optical network topology information and the basic packet capacity, wherein the combination of the basic packet capacity and the

basic optical capacity applied to the simulated packet network and a simulated optical network produce a co-modelled simulated packet transport network; and  
(3) the processor performing analysis on the co-modelled simulated packet transport network—;

wherein the step of the processor generating a basic packet capacity further comprises the steps of:

the processor combining the packet network topology information in the form of a packet network topology input and the packet traffic information in the form of a packet traffic matrix input to create the simulated packet network; and

the processor assigning each packet link of the simulated packet network a flow to create the basic packet capacity for the simulated packet network; and

wherein the step of generating a basic optical capacity comprises the steps of:

the processor combining the optical network topology information in the form of an optical network topology input and the basic packet capacity to form the simulated network; and

the processor assigning each optical link of the simulated optical network a flow to create the basic optical capacity for the simulated optical network.

9. (Cancelled)

10. (Cancelled)

11. (Previously presented) A method for co-modelling and analyzing according to claim 8, wherein the step of the processor performing analysis on the simulated packet network and the simulated optical network over which the simulated packet network operates comprises the processor performing network capacity planning of the simulated packet network and the simulated optical network over which the simulated packet network operates.

12. (Cancelled)

13. (Cancelled)
14. (Cancelled)
15. (Cancelled)
16. (Cancelled)
17. (Currently Amended) A computer readable medium having computer executable instructions stored thereon for execution by a computer processor, for, when executed, co-modelling a simulated packet network and a simulated optical network over which the simulated packet network operates, the simulated packet network representing a plurality of packet links between packet network nodes and the simulated optical network representing a plurality of optical links between optical network nodes, the computer executable instructions comprising:
  - (1)-computer executable instructions for generating a basic packet capacity comprising a capacity value for each packet link based on packet network topology information and packet traffic information; and
  - (2)-computer executable instructions for generating a basic optical capacity comprising a capacity value for each optical link based on optical network topology information and the basic packet capacity, wherein the combination of the basic packet capacity and the basic optical capacity applied to the simulated packet network and a simulated optical network produce a co-modelled simulated packet transport network—;

wherein the computer executable instructions for generating a basic packet capacity comprise:

computer executable instructions for combining the packet network topology information in the form of a packet network topology input to the computer processor and the packet traffic information in the form of a packet traffic matrix input to the computer processor to create the simulated packet network; and

computer executable instructions for assigning each packet link of the simulated packet network a flow to create the basic packet capacity for the simulated packet network; and

wherein the computer executable instructions for generating a basic optical capacity comprise:

computer executable instructions for combining the optical network topology information in the form of an optical network topology input to the computer processor and the basic packet capacity to form the simulated optical network; and

computer executable instructions assigning each optical link of the simulated optical network a flow to create the basic optical capacity for the simulated optical network.

18. (Cancelled)
19. (Currently Amended) A computer readable medium having computer executable instructions according to claim-18\_17, the computer executable instructions comprising:
  - (1)-computer executable instructions for receiving a packet network topology input at the computer processor;
  - (2)-computer executable instructions for receiving a packet traffic matrix input at the computer processor; and
  - (3)-computer executable instructions for receiving an optical network topology input at the computer processor.
20. (Currently Amended) A computer readable medium having computer executable instructions according to claim—18\_17, further comprising computer executable instructions for generating the packet network topology input, the packet traffic matrix input and the optical network topology input for use in co-modelling the simulated packet network and the simulated optical network over which the simulated packet network operates.

21. (Currently Amended) A computer readable medium having computer executable instructions according to claim—48\_17, wherein the packet network topology input comprises information regarding a plurality of routers in the simulated packet network, information regarding source-destination router ordered pairs in the simulated packet network, and information regarding a plurality of packet links in the simulated packet network, wherein computer executable instructions for assigning each packet link of the simulated packet network a flow comprises computer executable instructions for:

~~(1)~~-setting capacity to zero for all packet links;

~~(2)~~-performing a series of steps, as follows, for each source-destination router ordered pair;

A.—determining a shortest packet path between routers;

~~B.~~—establishing a source-destination packet traffic flow based on the shortest packet path;

~~C.~~—incrementing capacity of each packet link traversed by the packet traffic flow;  
and

~~(3)~~—increasing capacity of packet links per packet network engineering guidelines, wherein the packet network engineering guidelines pertain to average occupancy of the packet links.

22. (Currently Amended) A computer readable medium having computer executable instructions according to claim—48\_17, wherein the optical network topology input comprises information regarding a plurality of cross-connect switches in the simulated optical network and information regarding a plurality of optical links in the simulated optical network, wherein computer executable instructions for assigning each optical link of the simulated optical network a flow further comprises computer executable instructions for:

~~(1)~~-setting capacity to zero for all optical links;

~~(2)~~-performing a series of steps, as follows, for each packet link between two routers;

A.—determining a shortest optical path between cross-connect switches supporting the two routers;



- ~~B.~~—establishing an optical connection to support the packet link; and
  - ~~C.~~—incrementing capacity of each optical link traversed by the optical connection;
  - and
  - ~~(3)~~—increasing capacity of optical links per optical network engineering guidelines, wherein the optical network engineering guidelines pertain to occupancy of the respective optical links.
- 23. (Currently Amended) A computer readable medium having computer executable instructions according to claim 21, wherein the optical network topology input comprises information regarding a plurality of cross-connect switches in the simulated optical network and information regarding a plurality of optical links in the simulated optical network, wherein computer executable instructions for assigning each optical link of the simulated optical network a flow comprises computer executable instructions for:
  - ~~(1)~~—setting capacity to zero for all optical links;
  - ~~(2)~~—performing a series of steps, as follows, for each packet link between two routers;
    - A.—determining a shortest optical path between cross-connect switches supporting the two routers;
    - ~~B.~~—establishing an optical connection to support the packet link; and
    - ~~C.~~—incrementing capacity of each optical link traversed by the optical connection;
    - and
    - ~~(3)~~—increasing capacity of optical links per optical network engineering guidelines, wherein the optical network engineering guidelines pertain to occupancy of the respective optical links.
- 24. (Currently Amended) A computer readable medium having computer executable instructions stored thereon for execution by a computer processor, for, when executed, co-modelling and analyzing a simulated packet network and a simulated optical network over which the simulated packet network operates, the simulated packet network representing a plurality of packet links between packet network nodes and the

simulated optical network representing a plurality of optical links between optical network nodes, the computer executable instructions comprising:

- (1)-computer executable instructions for generating a basic packet capacity comprising a capacity value for each packet link based on packet network topology information and packet traffic information;
- (2)-computer executable instructions for generating a basic optical capacity comprising a capacity value for each optical link based on optical network topology information and the basic packet capacity, wherein the combination of the basic packet capacity and the basic optical capacity applied to the simulated packet network and a simulated optical network produce a co-modelled simulated packet transport network; and
- (3)-computer executable instructions for performing analysis on the co-modelled simulated packet transport network--;

wherein the computer executable instructions for generating a basic packet capacity comprise:

computer executable instructions for combining the packet network topology information in the form of a packet network topology input to the computer processor and the packet traffic information in the form of a packet traffic matrix input to the computer processor to create the simulated packet network; and

computer executable instructions for assigning each packet link of the simulated packet network a flow to create the basic packet capacity for the simulated packet network; and

wherein the computer executable instructions for generating a basic optical capacity comprise:

the computer executable instructions for combining the optical network topology information in the form of an optical network topology input to the computer processor and the basic packet capacity to form the simulated optical network; and

the computer executable instructions for assigning each packet link of the simulated optical network a flow to create the basic optical capacity for the simulated optical network.

- 25. (Cancelled)
- 26. (Cancelled)
- 27. (Previously presented) A computer readable medium having computer executable instructions according to claim 24, wherein the computer executable instructions for performing analysis on the simulated packet network and the simulated optical network over which the simulated packet network operates comprises computer executable instructions for network capacity planning of the simulated packet network and the simulated optical network over which the simulated packet network operates.
- 28. (Cancelled)
- 29. (Cancelled)
- 30. (Cancelled)
- 31. (Cancelled)
- 32. (Cancelled)